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EXAMINER	
CHERVINSKY, BORIS LEO	
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The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANANDAROOP BHATTACHARYA, RAVI S. PRASHER, JEROME L. GARCIA and SUZANA PRSTIC

Appeal 2008-2294
Application 10/723,533
Technology Center 2800

Decided: July 14, 2008

Before EDWARD C. KIMLIN, CHUNG K. PAK, and LINDA M. GAUDETTE, Administrative *Patent Judges*.

KIMLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 32-58. Claim 32 is illustrative:

32. An apparatus comprising:
a die including at least one integrated circuit and a surface;

a heat exchanger; and
a thermal management device having
a case with a plate attached to the surface of the die and cavity, and
a porous medium disposed within the cavity of the case and attached to the plate, the thermal management device to allow for a fluid to flow through said porous medium to thermally couple the die to the heat exchanger.

The Examiner relies upon the following references as evidence of obviousness:

Ozmat	5,402,004	Mar. 28, 1995
Dessiatoun	6,898,082 B2	May 24, 2005
Landin	6,410,160 B1	Jun. 25, 2002

Appellants' claimed invention is directed to an apparatus comprising a die including an integrated circuit, a heat exchanger and a thermal management device. The thermal management device comprises a case that is attached to the surface of the die and a porous medium disposed within a cavity of the device. The device allows fluid to flow through the porous medium before thermally coupling the die to the heat exchanger.

Appealed claims 32-39 and 41-58 stand rejected under § 35 U.S.C. 103(a) as being unpatentable over Ozmat in view of Dessiatoun. Claim 40 stands rejected under § 35 U.S.C. 103(a) as being unpatentable over the stated combination of references further in view of Landin.

We have thoroughly reviewed each of Appellant's arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art.

Accordingly, we will sustain the Examiners' rejections for the reasons set forth in the Answer, which we incorporate herein, and we add the following primarily for emphasis.

Ozmat, like Appellants, discloses a thermal management or cooling device for an integrated circuit comprising a case having a cavity which encloses a porous medium through which cooling fluid passes for controlling the temperature of the integrated circuit. As recognized by the Examiner, Ozmat does not disclose the use of a pump and heat exchanger associated with the cooling device. However, Appellants have not refuted the Examiner's legal conclusion that Dessiatoun evidences the obviousness for one of ordinary skill in the art to employ a pump and heat exchanger for circulating the cooling fluid in Ozmat's system.

A principal argument advanced by Appellants is that Ozmat and Dessiatoun "teach that thermal management devices are thermally coupled to dice[sic] through one or more interposing elements, rather than being attached to the surface of the dice[sic]" as presently claimed (Appeal Br. 7, paragraph 3). Appellants submit that Ozmat discloses "the interposing elements between chips **3**, **7**, and **9** and the plate **13** of the thermal management device include at least at the solder balls (shown in Fig. 3, but not discussed) and the substrate **11** (e.g., a printed circuit board), and the MMC plate **13**" (Appeal Br. 7, paragraph 4). Hence, Appellants contend that Ozmat and Dessiatoun fail to teach a thermal management device attached **directly** to a surface of a die.

We concur with the Examiner, however, that Appellants' argument is not germane to the claimed subject matter. As pointed out by the Examiner, the present claims on Appeal fail to recite that the thermal management device is **directly** attached to the surface of the die. Consequently, the appealed claims embrace within their scope a thermal management device attached to the surface of the die through intervening elements, such as with the indirect attachment of Ozmat and Dessiatoun. We find no merit in Appellants' argument that "[o]ne skilled in the art interpreting "plate attached to the surface of the die" in light of the present specification would clearly understand that the plate is directly coupled to the surface of the die without any interposing elements other than those used for said attachment, e.g., an adhesive such as a thermal interface material" (Reply Br. 2, paragraph 2). It is by now axiomatic that claim language is to be given its broadest reasonable interpretation during prosecution before the PTO and limitations found in the Specification are not to be read into the claims. *In re Etter,* 756 F.2d 852 (Fed. Cir. 1985). Moreover, we agree with the Examiner that "since the heat is primarily generated by the functioning die and not by the substrate", it would have been obvious for one of ordinary skill in the art to have the cooling device attached to the die side to remove heat more efficiently (Ans. 7, paragraph 2).

Appellants also maintain that neither Ozmat nor Dessiatoun teach a microporous medium. Only claims 46-49 on appeal recite a microporous medium and, as pointed out by the Examiner, Appellants' Specification does not define the pore size of a microprous medium. Hence, in the absence of

such a definition, the claim recitation does not serve to distinguish the claimed medium over the porous medium of Ozmat and Dessiatoun. In addition, Dessiatoun expressly states that the pin fin type heat transfer module is only exemplary and that other porous medium may be utilized, such as variable size sintered metal and ceramic particles, elongated variable size sintered metal and ceramic particles and fibers, etc. (see col.7, l. 29-col. 8, l. 1). Accordingly, we find that Dessiatoun would have suggested the use of known microporous medium in thermal management devices of the type disclosed by Ozmat and Dessiatoun.

Regarding claim 34, Appellants submit that the references do not teach or suggest a porous medium being configured based at least in part on the non-uniform heat distribution caused by the integrated circuit. However, we agree with the Examiner that the claim recitation fails to define any particular structure for the porous medium of the claimed apparatus, and it is reasonable to conclude that the design of the thermal management devices of the cited prior art are based on the heat distributation emanating from the integrated circuit which, necessarily, is non-uniform to some degree. Furthermore, as noted by the Examiner, "Dessiatoun discusses the non-uniform or various densities in order to provide various heat dissipation in different heat intensity areas" (Ans. 6, paragraph 2).

As for the claim 42 recitation that "the pump is to facilitate a fluid flow at rate to result in a two-phase fluid flow," it is reasonable to conclude that the pump of Dessiatoun is fully capable of operating at such a rate and Appellants have not established otherwise.

We also agree with the Examiner that it would have been obvious for one of ordinary skill in the art to couple any substrate to the second surface of a die. Significantly, claim 43 broadly recites any substrate, in general.

Concerning claim 47, we concur with the Examiner that the apparatus of Ozmat necessarily comprises a watertight seal between the case and the die. We do not understand Appellants' statement that "the cited references teach the fluid being disposed within the case, therefore there is no reason to teach a watertight seal" (Appeal Br. 14, paragraph 3). The fact that the fluid is disposed within the case would be a reason that a watertight seal be employed between the case and the die. Claim 47 encompasses a watertight seal provided by the case itself.

Appellants do not present a separate substantive argument for the rejection of claim 40 over the combined teachings of Ozmat, Dessiatoun and Landin.

As a final point, we note that the Appellants base no argument upon objective evidence of nonobviousness, such as unexpected results.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

tc

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